THE UNIVERSAL CONSCIOUSNESS
ON THE UNIVERSAL CODE
– An integrated approach –

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Abstract. There are many approaches to investigate the consciousness. In this paper we will show that it makes sense to speak about the consciousness as about the comprehension of something. Furthermore, to speak about the universal consciousness as about the universal comprehension of the universal code; the comprehension from different investigators, in different creativeness, through different epochs. We propose one approach which utilizes *the logic* in the sense of *logos* (from the ancient Greek *logos* meaning *coding*, as a something that was at the beginning). For living beings their *matter logos* point of departure is the periodic system of elements because genetic code is its second hand side. In the scientific work of D. I. Mendeleev the important aspects of periodic law were examined, which the 20th century scientists have never adequately understood. Also, Darwin's diagram, in his book *Origin of Species*, represents a specific code, which is the first example of the code model and the code system in biological science. What is the point of departure of *mind logos* it is difficult to say, but on the consciousness level, after five thousand years in the development of the binary numbering system, the time has become ripe for a unification of the two different approaches in studying the universe and human beings: the global-integral method of the Ancient East, based primarily on speculation (logic of *speculative mind*), and the single-partial method of the Modern West, based primarily on experimentation (the logic of *natural mind*). Even more, today it is becoming evident that a scientific basis of human consciousness cannot be understood without such unification. Before such a unification can be done, one possible general hypothesis about the existence of a universal *Mind/ Matter* code should be tested and proven. This paper is subject of that kind of consideration.

Key words: *logic, periodic system of elements, genetic code, microtubules, water, Yin-Yang code, consciousness*

1. INTRODUCTION

There are many approaches to investigate the consciousness. First of all, the physiological and psychological approaches. But, more in accordance with Russell's [1], and Vygotsky's [2] and less with Ashby's [3] and Arbib's [4] views, our *hypothesis* (in establishing our approach) is that the investigation of the consciousness must always consider the consciousness as a whole system, as a unity of physiological (including biochemical and biophysical) and psychological-logical characteristics. If so, if physiological characteristics must be in relation with physiological, and these in relation with logical characteristics, then the consciousness itself must also be *a relation* (Russell, p. 168: "... we are said to be 'conscious of' something; in this sense, 'consciousness' is a relation"; p. 170: "The ... relation to an 'object', it could be said, is characteristic of every kind of consciousness", p. 173: "Nevertheless we can distinguish 'mental' events from others ..."; Vygotsky, first chapter: "... consciousness is a unity of all functions"; Arbib, p. 1: "... all the functioning of the nervous system relevant to our study is mediated solely by passage of electrical impulses by cells we call neurons"; Ashby, p. 11: "... the book deals with only one of the properties of the brain, and with property - learning - that has long been recognized to have no necessary dependence on consciousness"; p. 12: " And until such a method ... the facts of consciousness cannot be used in scientific method").

Considering this concept, together with Russell's idea about consciousness as a relation to objects in sense to be 'consciousness of' something, with Sartre's idea [5] that any consciousness is the consciousness about something, with Petronijevic's idea [6] that the contents of the consciousness are the notions, and finally, with Einstein's idea [7] that all notions within 'natural laws' are from the space-time nature, we will show that it makes sense to speak about the consciousness as about the comprehension of something (to comprehend – to be in relation to something within the consciousness of someone!). By this if we can speak about a universal

concept of the organization of a *whole* from the *parts,* then it makes sense to speak about a universal consciousness of such an organization. On the other hand, if within such an organization must exist a *universal code*, then it makes sense to speak about the universal comprehension of the universal code.

Further, based on the said, it makes sense to investigation how human consciousness, in form of a comprehension, has been expressed itself through different epochs: in some specific ways, or in one and the same - universal way? In this paper we will show that that was the case: in the various works, by different creative investigators, within very different epochs, an exactly universal code has been expressed. On the other words, we will show that human consciousness was always in relation with a universal code through a specific manner.

2. PRELIMINARIES

More than any other scientists, Crick and Einstein are responsible for our link between the molecular basis of life and consciousness. Crick made first and important step, with arguments that consciousness is a property of molecular activities in neurons and networks of neurons in our brain [8], while a serious analysis of complete works of Einstein lead to the conclusion that when he speaks about the four-dimensional continuum of space-time, he means in fact three-four-dimensionality. This opens a possibility to speak about coding coordinates and coding spaces; by doing this, each Boole's space characterized by three-quaternity must be taken as Boole-Einstein's space. In fact Coding Space (CS) unavoidably should to be Coding Space-Time (CST), what is subject of the information physics as a new scientific discipline of space-time structures [9,10].

Remark 2.1. All the three elementary types of symmetries (1. in relation to the point, i.e. center, 2. in relation to the line or axis and 3. in relation to the plane) can be represented by the binary symmetry of the segment line, i.e. by the symmetry of the entities $A \leftrightarrow A'$ (or $A \leftrightarrow B$) in relation to the central entity C - the center of symmetry (whether or not it exists, represented only by

a point), where $AC = CA' = n$ and $AA' = 2n$. If so, then: the entity C contains (in itself) the quantity c ($c = n$), which represents the arithmetical mean for AC and CA'. This is the essence of binary symmetry as the "symmetry in the simplest case" (Marcus, 1989, p 103: "In its simplest form, in a one-dimensional Euclidean space, symmetry is defined with respect to one point. Given two points A and B in this space, the symmetric point C of A with respect to B is one such that the distance from C to B is equal to the distance from A to B, whereas the distance from C to A is the sum of these two distances"; Notice that our B or A' is Marcus' C and vice versa). This simplicity is the reason why we can consider the binary symmetry as the best possible symmetry. There is also the entity M which contains (in itself) the quantity m, where $m = 4/3\ n$, which represents the harmonic mean for AC and AA' (the essence of binary harmony!); AA' can be, in infinitely numerous ways, divided into two unequal parts; AA' can, in a finite number of ways, be divided into two parts which are proportional to each other (the essence of binary proportionality!) …There is exactly one of pair of parts (a, b) which represent the *golden section* along the segment line AA' (the essence of infinite division and the best possible proportion**!**).

Remark 2.2. The binary symmetry $A \leftrightarrow A'$ (or $A \leftrightarrow B$) in this paper is still understood, except by S. Marcus, in the sense used by P. Hilton and J. Pederson (1989, pp 73-74) so that the given entity from the pair A, A' (or A, B) "may admit several different combinatorial structures and each structure will be regarded as combinatorial distinct. You should thus be warned that [*entities*] which we regard as *the same* (i.e. combinatorial equivalent), you may hitherto have regarded as *different*; and [*entities*] which we regard as different (i.e. combinatorial distinct), you may hitherto have regarded as the same." For a better understanding of this we present a possible correspondence between their visual representations and our Figure 3 in this paper. The entity of their "cube" corresponds to the pyrimidine entity (in 32 combinations, or to be more correct, variations) on the left branch of the binary tree in our Fig. 3. On the other hand, their "prism" corresponds to our purine entity on the right side (also in 32 variations) in Figure 3. The entity on the left side of any one of the 4+4 classes of codons on the binary tree, in our Figure 3, corresponds to their left entity in their visual representation; a simpler cube model corresponds to our simpler pyrimidine (U) and/or simpler purine (A) entity; their right entity - a more complex cube model - corresponds to our more complex pyrimidine (C) and/or more complex purine (G) entity on the right side in Figure 3 (cf. analogous "cubes" and "prisms" in Fig. 3.5 in Dubinin, 1985, p 81).

Remark 2.3. Since the genetic code can be reduced to the Gray code model (Fig.1 in Swanson, 1984,p 188) and to a binary tree (Fig.1 in [14b] and Fig. 3 in this paper), with a starting codon UUU 000000 and a final codon GGG 111111, it follows that as to questions of symmetry in relation to the genetic code *the mathematical group theory* holds only partially (our hypothesis and a prediction of this remains for future researches). This results from the fact that the set Q of rational numbers, including zero, does not form *a group* with respect to a multiplication operation. The above mentioned is the reason why we won't use the mathematical group theory to research the symmetries of the genetic code in this paper.

The basic parameters which determine physico-chemical characteristics of *a system* of stable chemical elements are: atomic number, number of period, number of the group and number of isotopes. Mendeleev never used word *Table*, what we usually do, to present his work, but *System*. His original *System* of elements is different from our today's *Table* of elements. Science of 20th century escapes Mendeleev "mysterious" form of his system of elements, saying that Mendeleev made some arithmetical errors (ref. [11], p. 185). Mendeleev's "errors", or our inadequate understanding of his work, is the information (coding system $3^4 = 81$ and $4^3 = 64$) approach to elements. Information approach as coding approach. The coding system $3^4 = 81$ - because within first 84 chemical elements (from H = 1 to the Po = 84) there are exactly 81 stable elements. The coding system $4^3 = 64$ - because 84 minus 20 "mono-isotope" elements equals 64 (cf. ref. [12], ch. 27, sect. "Relations odd-even", where Gould says that all even elements to the polonium, Po = 84, have minimally two stable isotopes, except beryllium (cf. ref. [13], where it has been said that within chemical code there are exactly 84 elements; cf. also 64 hexagrams in Fig. 5 and 81 tetragrams in Fig. 6). Mendeleev clearly and precisely gave the system of chemical elements as a four-dimensional Boolean hypercube [14a]. The same approach, based on Boolean hypercube, has been used recently by Kauffman to explain the origins of order as point of departure of self-organization and selection in evolution [15].
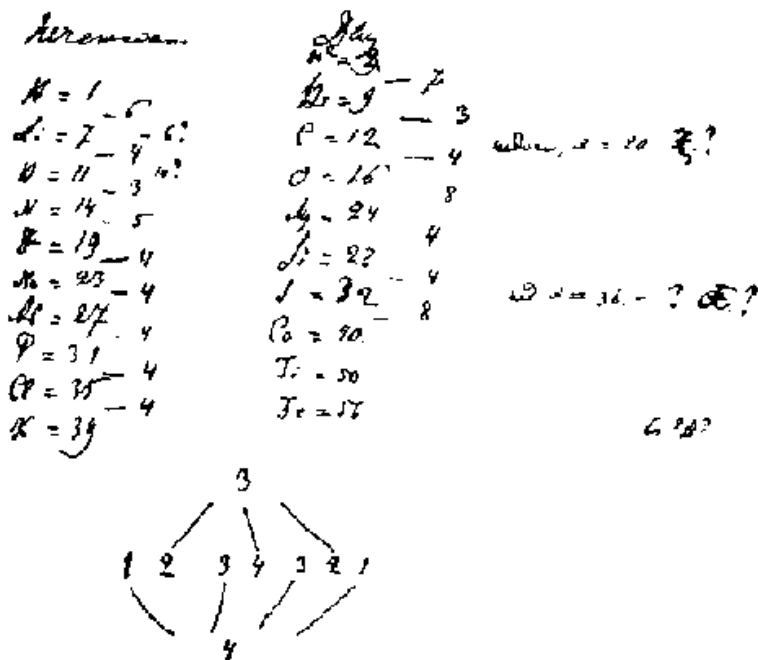
Figure 1. The universal consciousness on the universal code of the nature: the Mendeleev's system of chemical elements oddity-evenness principle; the valence trinity-quaternity system; the atomic mass distances integer system.

In the scientific work of D.I. Mendeleev, especially his original manuscript works (see ref. [11], pp. 128-129), three important aspects of periodic law were examined, which have never been adequately understood by 20th century science. These are: (1) the system relations among elements including odd-even principle, (2) spaciousness i.e. three-dimensionality (Figs. 1-2), and (3) cyclicity (photocopy XII in Kedrov: Cu, Ag, Au within first and after that within eighth group at the end, parenthetically). From these facts it follows that the third dimension of the periodic system as a "New dimension for Mendeleev" [16] is not necessary because Mendeleev was conscious of dimension 100 years ago. Also, Mendeleev was conscious of the problem of "rare earth", although there are different opinions (ref. [16], p. 13: "The two versions differ simply in their arrangements to accommodate elements such as the rare earths, but the result must be to

leave many with the impression that Mendeleev had not made up his mind about something of importance"). In his long periods Table (ref. [11], p. 188) Mendeleev gave a specific position to the first element of "rare earth", i.e. lantanides (Ce) - not in the third but in fourth group; then still 13 groups for 13 lantanides. If so, Mendeleev must have been seen conscious that the short periods Table with 8 groups of elements corresponds with cube, and long periods Table with a hypercube (8 group of non-rare earth elements plus 14 group of yes-rare earth elements with a superposition equal 14 groups; then: 14 groups plus the first group at the end, and plus the zeroth group equal 16 groups). On the other hand, Mendeleev was conscious of the fact that there must be 4 types of elements with correspondence to the square (for details see ref. [14a], pp. 197-200). Bearing in mind all these Mendeleev's insights, it was possible to determine the definitive real positions of elements within 3-4 dimensional periodic system (ref. [13], pp. 19-22). Other creative investigators, primarily Darwin and Mendel [14a] were conscious of square-cube-hypercube relations within natural systems.

Darwin's diagram, binary tree, represents the first systematic information approach to the analysis of the relations between organisms [17]. This is the only diagram in his book *Origin of Species* and it represents a model of interpretations of the origin of varieties, species, genera and higher systematic categories. By its essence, his diagram represents a specific code-model and code-system as the first example in biological science. Relations of the noted elements within this code system correspond to the relations of the organisms in the natural systems. Hidden message of this diagram now is clear: if the natural systems are at the same time the coding systems, the only adequate and complete way of description and interpretation of such systems would be the creation of adequate code models with adequately corresponding relations between the elements of the one and the other model.
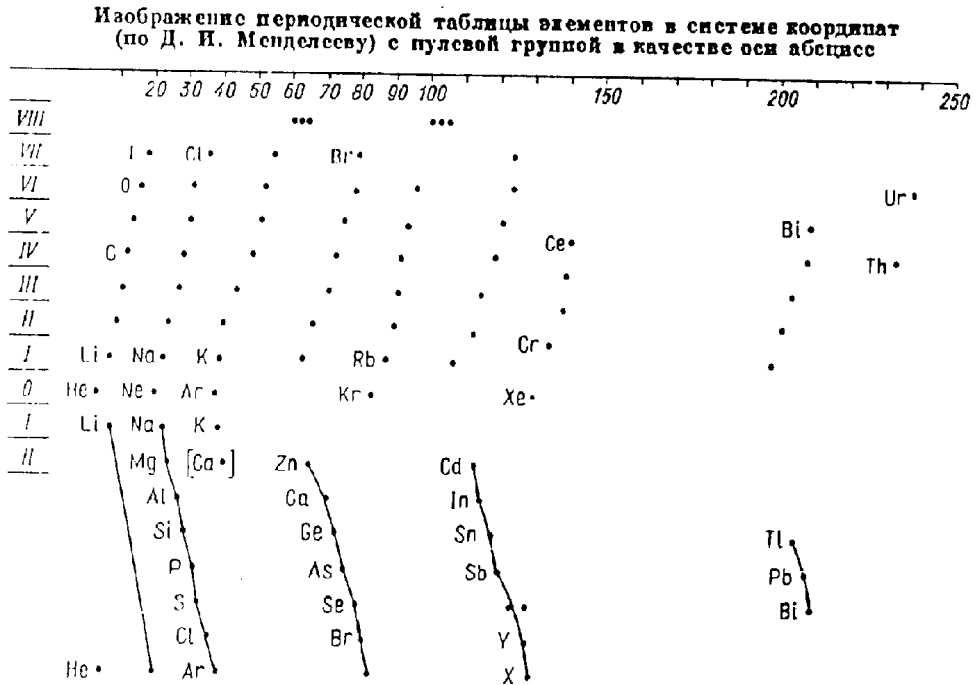
Изображение периодической таблицы элементов в системе координат
(по Д. И. Менделееву) с нулевой группой в качестве оси абсцисс

Figure 2. The universal consciousness on the universal code of the nature: the Mendeleev's three-dimensional periodic system as unity of cube-sphere; cube: through the three coordinates; sphere: the noble elements are at all three coordinates.

The main idea which is in the basis of the diagram - binary tree, is the realization of the logic of systematization and classification, separation of the parts within the whole, as well as the regularity of the hierarchy of the levels. The accordance of this logic with the model of classification of the number systems with the number basis $N_2 = 2(2n+1)$, where $n = 0,1,2,3$, is directly obvious. So, we have for $n = 0$, $N = 2$, which corresponds to the division of the binary tree to the left tree and the right tree. This is exactly what Darwin discussed on the relations during the evolution only along two lines at the beginning of which "species (A)" and "species (I)" occur: " These two species (A) and (I), were also supposed to be very common and

widely diffused species, so that they must originally have had some advantages over most of the other species of the genus". The obvious characteristic of the Darwin's diagram of the binary tree is that each transition to the next level completely follows the logic of the Gray code, since only a unit change is allowed [14a].

3. LOGIC OF THE EXISTENCE OF LIFE MOLECULES

The problem of accordance-discordance of the genetic code ($4^3=64$) and its physico-chemical basis was firstly stated by Crick who demonstrated that this problem is impossible to separate from the questions related to the ratio of probabilistic and deterministic in the coding process: the fact that codons X_1, X_2, X_3 ... are coding for amino acid Y results from numerous accidental processes during the evolution, or here strict (deterministic) reasons could be also included [18,19].

The very approach to the three-four-dimensional system of both the chemical code (Mendeleev) and the genetic code should be integral one: it has to be emerging logic approach. We have shown [14a] that atomic mass and number of isotopes represent the principal determinants of the chemical code ($3^4 = 81$), while binary values of codons and amino acids represent the principal determinants of the genetic code ($2^6 = 64$). (Figs. 3-4).

3.1. The Number of Trinity-Quaternity

The basic concept from which we start is the Boolean logical square. This hidden square exists within the Gray code model of genetic code [20,21]. The Gray code model of the genetic code can be *per se* developed in two types of the binary tree: (1) the binary tree which keeps the logic of the Gray code having characteristic that "two adjacent symbols differ at only one bit" [20], and (2) the binary tree with the logic of natural numbers series "for the numbers 0-63" [21]. With the first type of binary tree, the distances between codons are the unit Hamming distances if "measured" by weight,

i.e. by norm of Boolean vector, while with the second type of binary tree the distances are also the unit ones if "measured" via the vector number.
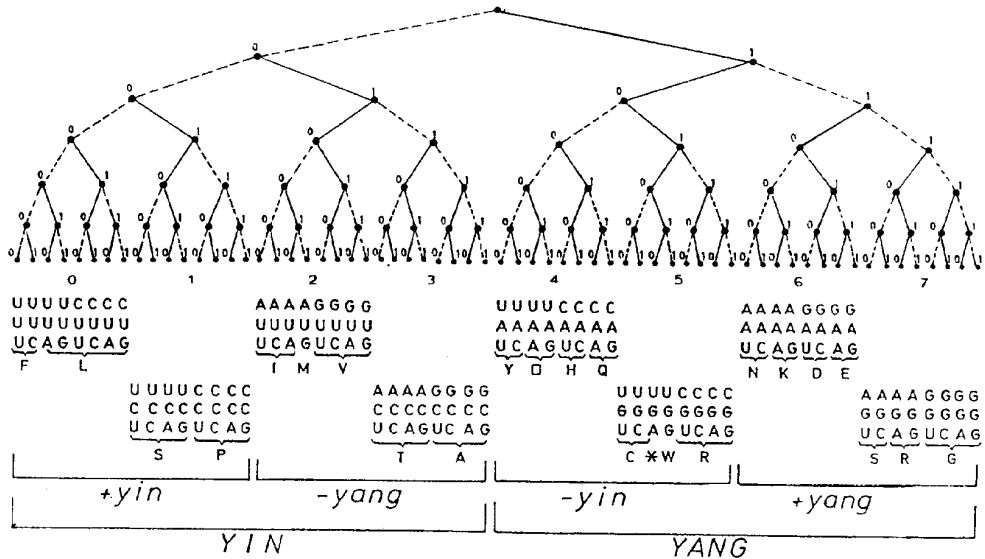

Figure 3. The universal consciousness on the universal code of the nature: the genetic code binary tree is in full accordance with the yin-yang binary tree in the oldest book - I Ching. The relations between 64 codons and 64 hexagrams: to each zero corresponds a broken line; to each one corresponds an unbroken line (see ref. [14a], p. 274). This binary tree of the genetic code with the order of the eight families of codons (rosettes), which corresponds to the series of natural numbers (0-7). The four 16-codon families begin with broken lines for +Yin and/or +Yang states; full lines for -Yin and/or -Yang states, reflecting the greater or lesser influence of bases of the *Py* and/or *Pu* type.

According to the logic of the Boole's square, longitudinal diagonal of the Boole's cube has to be labeled by the following sequence of corners: 1076. The end-corner, 1776, in the diagonal is optimal only in the system of trinity-quaternity (*TQ*): 1076 + 700 = 1776 (trinity because it is cube; quaternity because there are four positions; optimal because the corner 7 of the three-digit-record does not change position during "transition" to four-

digit-record). *TQ* system should be understood as the unity of Boole-Einstein's cube-hypercube: there are two sevens at the longitudinal diagonal as a result of permanent coping 0-7 and 7-0 (within the frame of the cube) and/or as a result of permanent motion from starting to middle point and backwards, i.e. from end-point to middle point and backwards (within the frame of the hypercube). Sevens from longitudinal diagonal are intercrossed by two sevens of the middle diagonal (within the frame of hypercube) which appear as a result of permanent coping 7-8 and 8-7. Therefore, at each moment of time, there is a system 0777-7777 in Boole-Einstein's coding space, and/or 1776-17776, if we take into account cyclicity of the system.
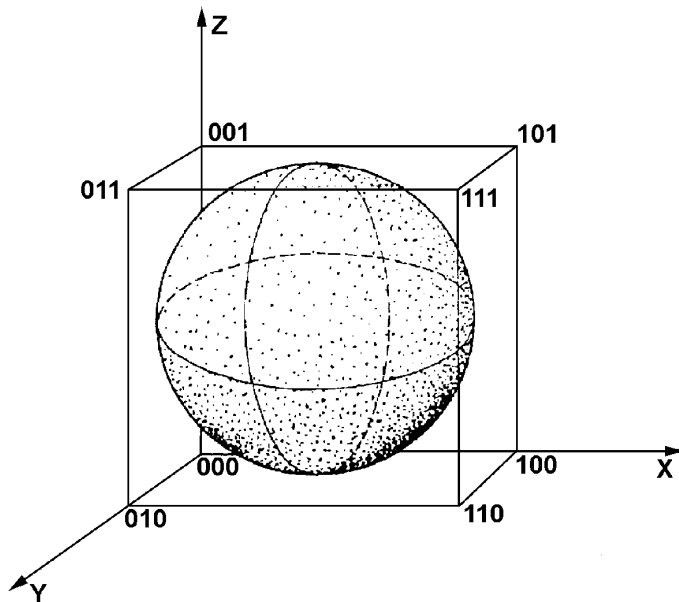
Figure 4. The universal consciousness on the universal code of nature: The Logical-Informational and Geometrical-Homeomorph-Topological (LIGHT) system of the Boolean cube–hypercube with an inscribed sphere-hypersphere, as the model of the genetic code, in full accordance with Mendeleev's cube-sphere model (Fig. 2) of the chemical code (for details see ref. [14a], p. 54).

3.2. The Genetic Code as TQ System

Analysis of the Crick's papers published immediately after 1966, upon definitive establishment of the Table of codons, demonstrates his sagacious observation of the problems imposed by Table itself, in spite of its beauty and symmetry. Determination of the number of problems and their denomination are ours, while the original statements are those of Crick.

(1) *Problem of the alphabets (problem of coding)*: Four-letter language of the nucleic acids has been studied in the meantime and we know how it controls 20-letter language (amino acids) of the proteins. However, in spite of the fact that numerous problems remained unsolved, this knowledge is certain;

(2) *Problem of the neighborhood (both codons and amino acids)*: Neighbor amino acids are coded for by neighbor codons;

(3) *Problem of similarity of codons*: It is sure that triplets coding for the same amino acid are most often very similar;

(4) *Problem of the position of base I, II, III in triplet*: In any case triplets with U and C at the end of the codon are coding for the same amino acid, and this is also very often the case with the triplets containing A and G as the end base;

(5) *Problem of selectivity of base I, II, III within a codon*: Amino acid is chosen mainly by the first two bases in a triplet;

(6) *Problem of a sign*: Is the allotment of a triplet to amino acids at random, or there are structural reason for this?

(7) *Problem of the meaning*: What is the sense of the synonymy through the third base, and what is the sense of the exceptions?

(8) *Problem of the form*: Form of the genetic code is established with a considerable certainty;

(9) *Problem of the essence (what is the "corner stone")*: Genetic code is an important corner stone at the long path of molecular biology and biological life;

(10) *Problem of the origin and evolution of the genetic code*: When we answer all these questions, the question of the origin of the genetic code will

remain as the major problem. Is the genetic code the result of a series of evolutional coincidences? The origin of the genetic code will remain as the major problem.

Two amino acids; *serine* and *arginine* have been the main problem not only for Crick, but also for all other researchers undertaking serious studies on the essence of the genetic code. The codons coding for these two amino acids for each of them are very different and even separated in the table. This is then the reason Crick could not claim with certainty that similar codons code for similar amino acids (this should be expected on the basis of chemistry) or that neighbor codons code for the same amino acid. So, Crick could only say that they are "the most often very similar". Position of the third base within a triplet makes new problems. Coding process is not affected when pyrimidine bases (U and C) appear in the third position, i.e. the same amino acid is coded (synonymy). If we use information-topological model of the genetic code it is practically possible to solve all ten Crick's problems of genetic code: four-letter language is at the same time the language and the chemical essence; similar codons indeed code for similar amino acid and again without an exception; neighbor codons code for the same amino acid and again without an exception. In our information geometry approach [14a] genetic code is completely characterized by entity of *TQ* system. Two pyrimidine (*Py*) and two purine (*Pu*) bases are inevitably expressed in the coding space as the system 3+1 (three with oxo-group and one without it, or three with amino group and one without it). Therefore the number of codons in the table of the genetic code by positions in four groups should read from an aspect of the main coding position. In spite of this distinction 3+1 only on the basis of numbers presented in this manner it is impossible to understand possible physico-chemical meaning of *TQ* system in the genetic code without an analysis of the internal structure. Each position consisting of 16 units can be taken as position with the structure 8:8 what makes sense from a physico-chemical aspect, since 16 families of codons $(1·16)·4 = 64$ could be understood also as a system of $(2·8)·4 = 64$ codons. In one family of higher order (eight-membered one) there can be 8 codons with *Py* base in the first position, and/or 8 codons with *Pu* base in

the first position. However, there is a question whether classifications such as (8-1):(8+1), (8-2):(8+2), or some others make sense? We will put forward the *hypothesis* that the classification (8-1): (8+1), so 7:9 makes sense also from an aspect of strictly determined physico-chemical parameters such as hydropathy (H) or polarity (P), as well as from an aspect of the principal parameter of the binary value. (For details see ref. [14a], pp. 253 and 255-260). It was proposed the existence of binary values for the entities of two pyrimidine and two purine bases: *U(00), C(01), G(10), A(11)* [22]. Swanson made the same assumption, but with a significant difference: *U(00), C(01), A(10), G(11)* [20]. She showed that the binary record of a codon must begin with the second (middle) and not the first base, as was proposed by Schonberger. When we used our *TQ* coding system we satisfied all Crick's genetic code problems and find similarity with quantization the magnetic quantum number (-3,-2,-1,0,+1,+2,+3). This indicate the basic biomolecular information processing associate with quantum field trough coding. Our results of genetic code are summarized in ref. [14a]. We can say that genetic code is preamble of biological consciousness which arise in proteins-water interaction and through activities of cell (molecular networks), body network, neural networks and brain, that lead human beings to be conscious ([8], 10]).

3.3. The Microtubules Coding System

Microtubules coding system was identified by Koruga [23]. There is microtubule coding system of two codes; $K_1[13,2^6,5]$ and $K_2[24,3^4,13]$. First code, K_1, is result of tubulin subunits, packing in proto-filaments by screw symmetry. This code has 64 codewords, length 13 and distance 5 (the best known binary error-correcting code).
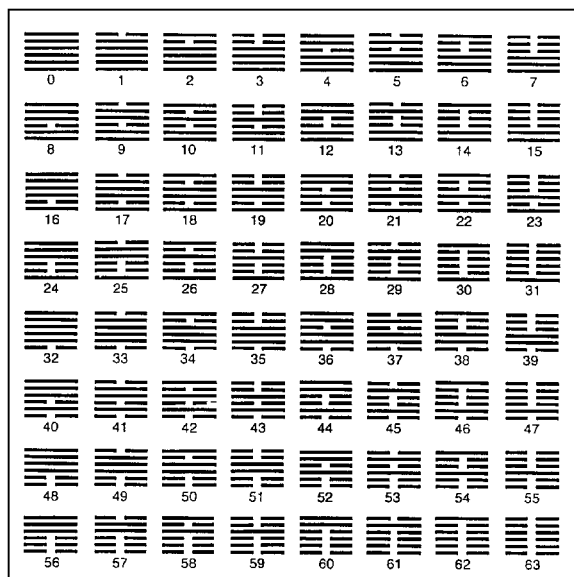
Figure 5. A speculative system of ancient China, based on hexagonal arrangement: It consists of 64 hexagrams ($2^6 = 64$), which display every possible combination of archetypal human situations – along with thousands of variations caused by changing lines. Notice that an inverse countdown is possible. In such a case the 63rd number is zeroth.

The second code, K2, is result of interaction of 24 tubulin subunits and high molecular weight MAP (microtubule-associated proteins). This code has 81 code-words, length 24 and distance 13 (the best efficient code for information transmission) (cf. these 64 and 81 code-words with analogous "code-words" within chemical code, mentioned in Preliminaries).

3.4. The Biological Water "**Mystery**"

The essential role of water has been recognized in all studies of biological processes, but it is a paradox that we know very little about order and properties of "biological water". Water seems to be the fastest solvent, because simulations predict and experiments verified femtosecond dynamics of water [24a]. It is well known that water molecules may be organized in different ways but one of the most promising is the clusters organization.

Water clusters may exist with 10 to 1000 water molecules. An approach of water cluster cellular automata (WCCA) may be the right way to solve the problem of its "mysterious" role in biological information processes.
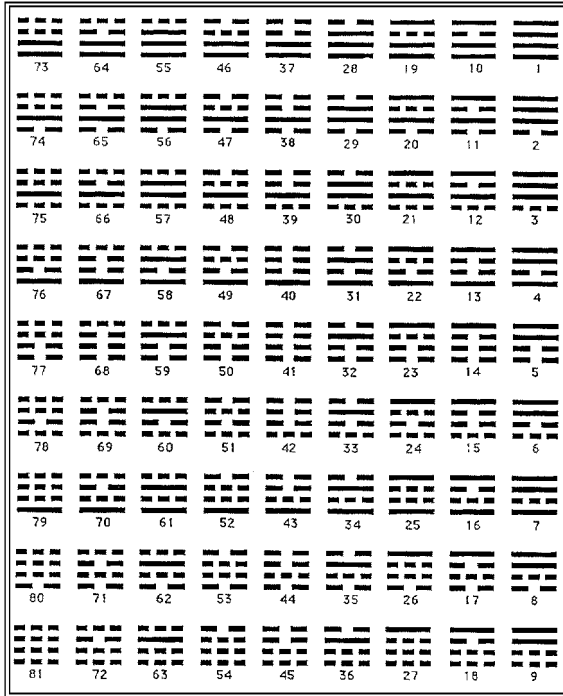

Figure 6. A speculative system of ancient China, based on tetragrams arrangement: A tetragram is constructed from four stacked lines of three types (solid, broken, and twice-broken). There are 81 possible combinations of these three types of lines (3^4=81). It is no accident that ancient Chinese book *Tao Te Ching* has eighty-one chapters, what is also a significant number to those Chinese philosophers who treasured the symmetry of numbers. Notice that an inverse countdown is possible. In such a case the 81st number is zeroth. If so, then $3 \cdot 4$ and 3^4 are the numbers of lines and tetragrams, respectively.

However, how much "Water mystery" is only an extraordinary otherness and specificity of the water, it has been shown in Ref. [24b]. Among other things, it is quoted the work of Russian biologist Afanasii Semenovich Troshin, from 1957, in which he set forth the hypothesis that the plain water and the water of cytoplasm within the cells differ. This corresponds with our hypothesis that the chemistry of life is more than the chemistry in the laboratory.[1]

4. LOGIC OF SPECULATIVE MIND

The logic of *natural mind* is primary result of human brain adaptation through its interaction with environment (Nature), while the logic of human *speculative mind* is primary result of human field based mind interaction with *Mind Itself*. The best example of speculative mind related to natural mind is Chinese concept of *Yin-Yang*, while Chinese concept of *Dao* may be related to *Mind Itself*. Schonberger was the first to point the possibility of making the *I Ching* and the genetic code conform to the same model by using binary records [22].

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[1] "All together, they favor the recognition that the chemical reactions that determine the GC are not only the reactions in a "test tube", but these reactions are associated with a specific balance of the number of particles (atoms and nucleons); balance, determinated by unique arithmetic and algebraic regularities and expressed in the form of specific (nonfractal) self-similarity ("a harmonized chemistry"). From this it follows further that presented facts also support the hypothesis that the genetic code was from very beginning, in prebiotic times and conditions, a complete code. On the other hand, the knowledge that "the chemistry of living" is actually a harmonized chemistry requires great care in medicine, agriculture and natural environment, taking into account the fact that this harmonization is strictly immanent to the living as such, mediated by genetic code as such" [24c].
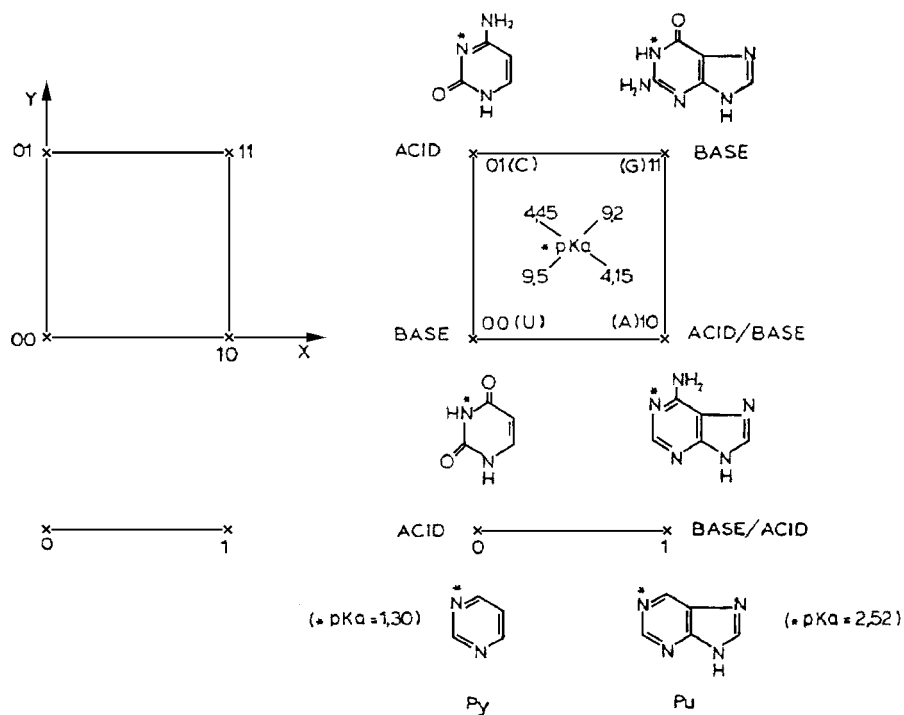
Figure 7. The universal consciousness on the universal code of Nature: the Boolean logical square of the genetic code is in full accordance with the Aristotelian (Boolean) logical square of four entities (cf. Fig. 8) (For details see ref. [14a], p. 8).

4.1. The Dao and Mind Itself

From a scientific point of view we do not know yet what *Mind Itself* is, but if we identified *Mind Itself* with *Dao* we can learn that

> The Dao that can be expressed
>   Is not the Dao of Absolute.
> The name that can be named
>   Is not the name of the Absolute.
>
> The Dao is empty and yet useful;
>   Somehow it never fills up.
> So profound!
>   It resembles the source of All Things.

4.2. Yin-Yang and Natural Mind

We shall demonstrate the underlying meaning of the link, coherence and interdependence of the natural code (*natural mind*) and the I Ching code (*speculative mind*). We shall show that there is a complete and perfect correspondence between the *Yin-Yang* entities in the I Ching code ($2^6 = 64$) and the pyrimidine-purine entities in the genetic code. Our starting point has been Stent's discovering that *Yang* (the male or light principle) is identified with the purine bases and *Yin* (the female or dark principle) with pyrimidine bases [25]. It was known in the ancient China that the Yin-Yang entities may be extended, so there can be +Yin (Great Yin) and -Yin (Lesser Yin) or +Yang (Great Yang) and -Yang (Lesser Yang), what lead us to new conclusions, which can be summed up in Figs. 3-8 and the following points:

(1) Boole's logical square lies at the heart of the I Ching as well as of all natural codes. The logical square of the four entities of the I Ching should be turned 180^0 to make it correspond to the logic square of the four elements known to Aristotle: *Air* and *Fire* associated with *Yang,* and *Earth* and *Water* with *Yin* (Fig. 8).

(2) There is complete congruence and correspondence between the six-bit binary records for the 64 codons and the binary records for the 64 hexagrams in the I Ching (Fig. 5).
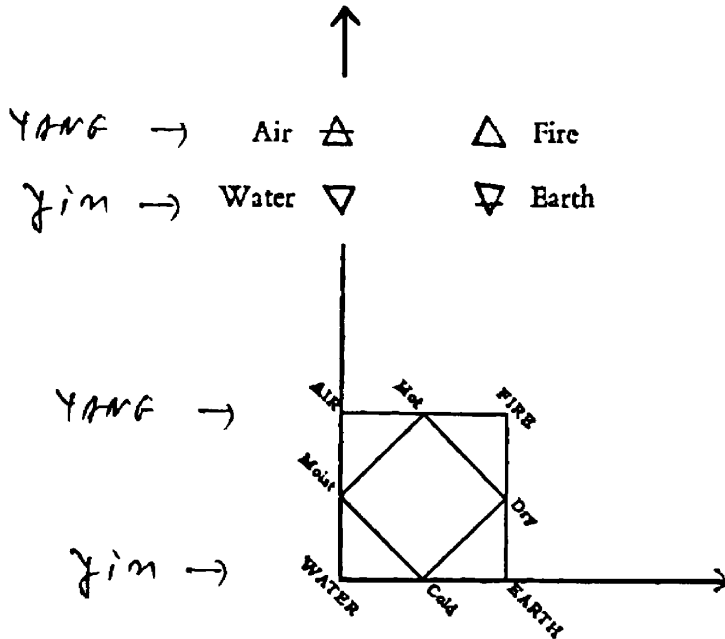
Figure 8. The universal consciousness on the universal code of Nature: the Alchemists' (Boolean) logical square follows from Aristotelian square; both are in accordance with the yin-yang system and with the genetic code logical square (cf. Fig. 7); further, they are in accordance with the fundamental particles square: neutrino (00), electron (01), quark down (10), quark up (11). For the (Boolean) logical square regarding the fundamental particles see ref. [14a], p. 283.

(3) The binary tree of the *I Ching* should be turned 180^0 for it to fit exactly over the binary tree of the genetic code; then both binary trees correspond to Farey's binary tree, which determines the quasiperiodical transition to deterministic chaos (cf. ref. [14a], p. 280).

(4) The eight trigrams in the *I Ching* are analogous to the eight rosettes, i.e. eight families of codons on the binary tree of the genetic code (Fig. 3). However, the system: *+Yang, -Yang, +Yin, -Yin* may be presented as $3^4 = 81$ (Fig. 6). This indicates that *Yin-Yang* coding system is the same as microtubules coding system.

5. FINAL COMMENTS

In fact the three quoted aspects of periodic law are of great importance today, when it has been demonstrated that the system entity, spatiality, periodicity and cyclicity are the most important characteristics of the genetic code (Figs. 3-4). From these figures it is clear why it is sensible to speak about the chemical code in connection with the genetic code. There are certain aspects of correspondence and coherence of the two codes: (1) within the genetic code there are exactly 61 amino acid (stable aggregation) meaning codon situations, plus 3 breaks in amino acid meaning (3 "stop" codons), plus 20 non-codon situations (20 protein amino acids); (2) within the chemical code there are exactly 61 situations (in the form of stable aggregations) which have multi-isotope meaning, plus 3 breaks in stable isotope (3 "stop" situations: Tc, Pm, Po), plus 20 non-(stable) isotope situations (20 "mono isotope" elements). Thus altogether there are 84 entities within both the genetic, and chemical codes. This, is the very topic: the chemical code, built on the very principles mentioned and in complete accordance with the genetic code. Such a surprisingly simple model at the same time represents the Logical-Informational and Geometrical-Homeomorphous-Topological (LIGHT) system of the Boolean cube-hypercube with an inscribed sphere-hypersphere (Fig. 4). The 8 vertices of the cube in Fig. 4 correspond with the 8 rosettes on the binary tree in Fig. 3 (8 families of codons); the 16 vertices of imagined hypercube correspond with 16 families of codons on the binary tree.

d	c	b	a	e	f
				•	1
1	0	1	00001		
1	0	1	00002	2	9
1	1	0	00004	1	1
1	0	1	00008		
1	0	1	00016	2	12
1	1	0	00032		
1	1	0	00064	2	3
1	0	1	00128	1	M
1	1	0	00256		
0	1	0	00512	2	3
1	0	1	01024		
1	0	1	02048	2	12
0	1	0	04096	1	1
0	0	1	08192		
0	0	1	16384	2	9
				•	1

Figure 9. The universal consciousness on the universal code of Nature: the Homer's and Njegoš's (Boolean) space sequence, $N=2^n$. (a) The binary sequence whose sum is $2^{15}-1=32767$; (b) Homer's choice: $27803_{10} = 66233_8 = 110110010011011_2$ (the number of verses for *Iliad* plus *Odyssey*); (c) Njegoš's choice: $4964_{10} = 11544_8 = 001001101100100_2$ (*The Mountain Wreath*: printed version 2819 verses plus 318 person-scenes, plus 116 pages for printing = 3253; manuscript version 1528 verses plus 150 person-scenes plus 033 pages = 1711; all together - the total spaces of *The Wreath*: 3253 + 1711 = 4964); Homer's plus Njegoš's system: $66233_8 + 11544_8 = 77777_8$; (d) Homer's choice: $3583_{10} = 6777_8 = 000110111111111_2$. The number 3583 represents the

difference of *Iliad* and *Odyssey*: 15693 - 12110 = 3583. The relation between two numbers 77777_8 and 6777_8 was given through a logic program: to exclude first position, and then - to write the result (7777_8); after that: to exclude first unit in the first position, and, then to write the result (6777_8). The choice logic for the number $3583_{10} = 6777_8$ is as follows. From the total sequence ($2^{15} - 1$) to exclude all the situations that contain the whole third perfect number 496; (e) The number of Homer's yes-choice and non-choice situations; (f) The (in literary science) known composition sequence of *Iliad*: from the middle point Mission to Achilles) 1 day full, 9 empty of events etc.

The basic (main) relations, determinants and invariants within the binary tree, i.e. within the system of cube-hypercube are the relations of a Boolean logical square. There are 4 types of molecules within the genetic code: Uracil (U = 00) with number 0 of Boolean vector, Cytosine (C = 01) with number 1, Adenine (A = 10) with number 2 and guanine (G = 11) with number 3 of Boolean vector (Fig. 7). Also, there are 4 types of chemical elements: s(00), p(01), d(10) and f(11) in relations of the Boolean logical square; plus 4 types of fundamental particles: neutrino (00), electron (01), quark down (10) and quark up (11). Fig. 8 illustrates the consciousness about logical square relations within the Universe of Aristotle and Alchemists. The periodicity and cyclicity within the genetic, as well as within the chemical code, are in accordance with periodicity and cyclicity of the natural number systems with the base $N_1 = 2^n$ ($n = 1, ..., 6$) and $N_2 = 2(2n+1) = 4n+2$ ($n = 0, ..., 5$). The relations within these mathematical number systems lead to the Golden Mean, as one of the most important Laws in Nature (for details, see ref. [14a]). It could be said that these number systems are the natural number systems. And then a new surprise: human consciousness in some specific way expresses itself through masterpieces such as those written by Goethe, Shakespeare, Tolstoy, Njegoš. We find their compositions were written according to the same Law as possessed by the chemical and genetic codes - the Golden Mean. Fig. 9 shows how Homer and Njegoš generated their works from the binary sequence $N_1 = 2^n$.

From this discussion it follows: it makes sense to give some separate hypotheses for further investigation. For example: (1) Human consciousness as a specific brain-computer code must be determined by Boolean spaces; (2) Human consciousness in the form of human language must be determined by Boolean logical square (Fig. 10); (3) Human consciousness as logical reason (syllogism etc.) must also be determined by Boolean logical square (Fig. 11).

PRINCIPES DE PHONOLOGIE

On obtient ainsi le schéma des variations possibles :

	I	II	III	IV
a b c d	Expiration Art. bucc. [] []	Expiration Art. bucc. ~~~ []	Expiration Art. bucc. []	Expiration Art. bucc. ~~~ .....

La colonne I désigne les sons *sourds.* II les sons *sonores,* III les sons sourds nasalisés, IV les sons sonores nasalisés.

Mais une inconnue subsiste : la nature de l'articulation buccale ; il importe donc d'en déterminer les variétés possibles.

Figure 10. The universal consciousness on the universal code of Nature: De Saussure's sound system of natural language can be seen as a specific Boolean logical square: I(00), III(01), II(10), IV(11) ... (cf. De Saussure's natural language designation system ref. [26], p. 70 and R. Swanson's genetic code designation system ref. [14a], p. 10).

6. CONCLUSIONS

The periodicity and cyclicity within the periodic system of elements, genetic code, microtubule code and *Yin-Yang* system, are in accordance with periodicity and cyclicity of the natural number systems with the base $N_1 = 2^n$ ($n = 1, ..., 6$) and $N_2 = 2(2n+1)$ ($n = 0, ..., 5$). The relation within these mathematical number systems is the *Golden Mean.*

To understand the biophysical mechanism of information processes the main investigation should be done in both fields water coding system(s) and water-biomolecules interaction. There is a strong indication that water code(s) should be given by natural systems, N_1 and/or N_2.

Our main hypothesis in establishing our approach is that investigation of consciousness must always consider the whole system as a unity of *mind/matter*. We have shown that *speculative mind* (*Yin-Yang*) and *matter* (periodic system of elements and genetic code) have the same coding system. The link between *Mind* (as quantum field entity of empty space - *pure vacuum*) and *Matter* (as mass organized entities) are microtubules and their interaction with water.
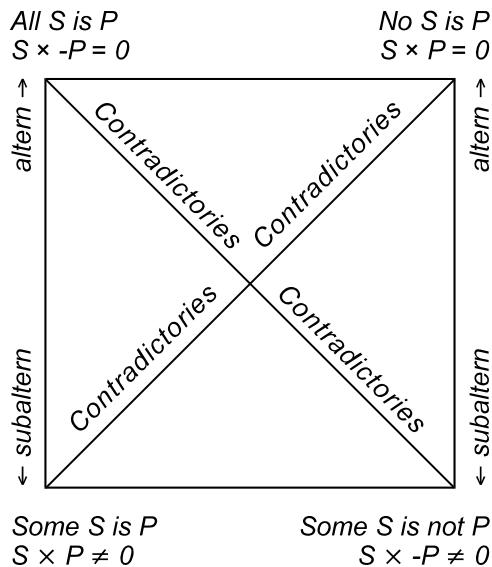

Figure 11. The universal consciousness on the universal code of Nature: Aristotle's syllogism "square of opposition" can be seen as specific Boolean logical square: No S is P (00), Some S is not P (01), Some S is P (10), All S is P (11) ... (cf. ref. [27], p. 341).

We believe, based on our knowledge, that human consciousness as mind/matter unity arises from this interaction. Considering this concept,

together with Russel's idea about consciousness as a relation to an object in the sense of being conscious of something, we believe that human consciousness in some specific ways has expressed human being itself in the various works by different creative investigators through different epochs.This universal code as the basis of separate natural codes (chemical, genetic codes etc.) must be determined by Boolean spaces. Thus follows the hypothesis that human consciousness must also be determined by Boolean logical spaces.

This Boolean logical spaces concept of the universal consciousness must be provided by further investigation from different aspects. For example, from the aspect of an existing or not existing accordance with the quantum physics concept [28] and information physics [9].

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